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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,334	09/18/2003	Stephen R. Barnes	2003P11510US	5441

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Siemens Corporation  
Intellectual Property Department  
170 Wood Avenue South  
Iselin, NJ 08830

EXAMINER
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CWERN, JONATHAN

ART UNIT	PAPER NUMBER
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3737

MAIL DATE	DELIVERY MODE
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05/13/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/665,334	<b>Applicant(s)</b> BARNES, STEPHEN R.	
	<b>Examiner</b> Jonathan G. Cwern	<b>Art Unit</b> 3737	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3-25 and 27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-25 and 27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 9/18/03 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Specification***

The abstract of the disclosure is objected to because the abstract is greater than 150 words in length. Correction is required. See MPEP § 608.01(b).

The disclosure is objected to because of the following informalities: in paragraph [0030], line 8, “first material 18” should be changed to “first material **16**”.

Appropriate correction is required.

### ***Claim Objections***

Claims 21-25 are objected to because of the following informalities: In claim 21, “the transducer material” lacks antecedent basis. In claim 24, the use of the term “transducer material having an array of elements” is confusing because “a membrane of a capacitive membrane ultrasound transducer” is used earlier in the claim. These appear to be describing the same element. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 15, 17-20, and 23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject

matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification does not disclose the thermal conductivity of the transducer material or the backing materials, and does not disclose the acoustic absorption of the backing materials.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –  
(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 10-11 and 15-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Baumgartner et al. (US 6831394).

Baumgartner et al. show a backing material for micromachined ultrasonic transducers. An array of cMUT transducer cells is fabricated on a silicon wafer (column 4, lines 45-48). A backing layer is attached to the array of cMUT cells (column 5, lines 15-34). The backing material may also possess a high thermal conductivity to assist in removal of heat from the device (column 5, lines 53-59 and column 7, line 65-column 8, line 17). The backing material is matched in acoustic impedance to the silicon, to prevent reflection of acoustic energy. The material may comprise a composite material containing tungsten. The acoustic impedance of the material was 19.4 Mrayls, with an

acoustic attenuation of -4.9 dB/mm at 5MHz. Baumgartner et al. further state that one of ordinary skill in the art would recognize that the composition of the acoustic backing material can be varied (column 6, line 55-column 7, line 64).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3-8, 13-14, 17-25, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baumgartner et al. (US 6831394) in view of Proctor, Jr. (US 4782701).

Baumgartner et al. show a backing material for micromachined ultrasonic transducers. An array of cMUT transducer cells is fabricated on a silicon wafer (column 4, lines 45-48). A backing layer is attached to the array of cMUT cells (column 5, lines 15-34). The backing material may also possess a high thermal conductivity to assist in removal of heat from the device (column 5, lines 53-59 and column 7, line 65-column 8, line 17). The backing material is matched in acoustic impedance to the silicon, to prevent reflection of acoustic energy. The material may comprise a composite material containing tungsten. The acoustic impedance of the material was 19.4 Mrayls, with an acoustic attenuation of -4.9 dB/mm at 5MHz. Baumgartner et al. further state that one of ordinary skill in the art would recognize that the composition of the acoustic backing

material can be varied (column 6, line 55-column 7, line 64). Baumgartner et al. fail to show using two different materials for the backing, and using an anechoic surface shape.

Proctor discloses a transducer for measuring transient tangential motion. Proctor teaches the use of a transducer backing, which contains two different materials. The backing has a shape that causes vibrations from the transducer to be reflected many times within the backing, preventing the vibrations from re-entering the transducer (anechoic surface). This structure is equivalent to the claimed "Rayleigh dump". This structure is described in applicant's specification in paragraph [0023], where it is also stated that any other now known or later developed anechoic surfaces may be used. The first backing material has acoustical properties similar to that of the transducer material and is a solid block of metal. The second backing material has high absorption and scattering of ultrasonic energy in the frequency range of operation of the transducer (column 4, line 53-column 5, line 15 and Figure 1).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used two materials and constructed the shape of the backing material so as to prevent vibrations from re-entering the transducer as taught by Proctor, in the device of Baumgartner et al. Baumgartner et al. attempt to test different variations of backing material to find a suitable combination of acoustic impedance and absorption, so as to improve the transfer of energy from the transducer to the backing, while also ensuring that the sound does not return to the transducer, using one backing material. However, this technique will result in a tradeoff in

optimizing those two properties. The two material technique taught by Proctor will provide a suitable substitution and improvement, by using one material to improve the transfer of energy, and a second material to ensure the sound does not return to the transducer. Designing the backing shape preventing vibrations from entering the transducer is an additional benefit.

In addition, while specific percentages have been claimed in regards to the acoustic impedances of the backing materials and the transducer materials, it would be obvious to one of ordinary skill in the art to slightly modify the materials to achieve those goals. So long as the first backing material is a close match to the transducer material, and the second backing material acts as a good absorber.

Also, as the backing material acts to “guide” the acoustic waves, the material can be considered a “wave guide”.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baumgartner et al. (US 6831394) in view of Proctor, Jr. (US 4782701) as applied to claim 8 above, and further in view of Sudol et al. (US 5629906).

Sudol et al. disclose an ultrasonic transducer. Sudol et al. teach that aluminum or tungsten can be used in the backing layer (column 4, lines 1-30).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used aluminum in the backing material as taught by Sudol et al., in the device of Baumgartner et al. One of ordinary skill in the art, when designing a transducer, can select whichever metal is most appropriate based on the

desired properties of the backing layer. The use of a variety of different metals being used as a backing layer is old and well known in the art.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baumgartner et al. (US 6831394) in view of Sudol et al. (US 5629906).

Baumgartner et al. show a backing material for micromachined ultrasonic transducers. An array of cMUT transducer cells is fabricated on a silicon wafer (column 4, lines 45-48). A backing layer is attached to the array of cMUT cells (column 5, lines 15-34). The backing material may also possess a high thermal conductivity to assist in removal of heat from the device (column 5, lines 53-59 and column 7, line 65-column 8, line 17). The backing material is matched in acoustic impedance to the silicon, to prevent reflection of acoustic energy. The material may comprise a composite material containing tungsten. The acoustic impedance of the material was 19.4 Mrayls, with an acoustic attenuation of -4.9 dB/mm at 5MHz. Baumgartner et al. further state that one of ordinary skill in the art would recognize that the composition of the acoustic backing material can be varied (column 6, line 55-column 7, line 64). However, Baumgartner et al. fail to show the specific use of aluminum as the metal.

Sudol et al. disclose an ultrasonic transducer. Sudol et al. teach that aluminum or tungsten can be used in the backing layer (column 4, lines 1-30).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used aluminum in the backing material as taught by Sudol et al., in the device of Baumgartner et al. One of ordinary skill in the art, when



designing a transducer, can select whichever metal is most appropriate based on the desired properties of the backing layer. The use of a variety of different metals being used as a backing layer is old and well known in the art.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baumgartner et al. (US 6831394) in view of Proctor, Jr. (US 4782701) as applied to claim 1 above, and further in view of Miller David G. et al. (US 5267221).

Miller et al. disclose backing for an acoustic transducer array. Miller et al. teach that the acoustic impedance of the backing material can be selected to cause the backing material to function as a waveguide (column 6, lines 49-68).

It would have been obvious to one of ordinary skill in the art, to have selected the acoustic impedances of the backing material to allow the backing to function as a waveguide as taught by Miller et al., in the device of Baumgartner et al. This will allow the backing to draw acoustic energy away from the transducer, further ensuring that energy will not be reflected back to the transducer.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1, 3-25, and 27 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan G. Cwern whose telephone number is (571)270-1560. The examiner can normally be reached on Monday through Friday 9:30AM - 6:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on 571-272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jonathan G Cwern/  
Examiner, Art Unit 3737

/Ruth S. Smith/  
Primary Examiner, Art Unit 3737